GULBARGA UNIVERSITY, KALABURAGI

DEPARTMENT OF COMPUTER SCIENCE

NATIONAL EDUCATION POLICY-2020 (NEP-2020)

SYLLABUS FOR BACHELOR OF SCIENCE (BASIC & HONOURS)

WITH COMPUTER SCIENCE AS MAJOR & MINOR COURSES

(B.Sc.)

(NEP-2020 CBCS SCHEME)

(SYLLABUS WITH EFFECT FROM ACADEMIC YEAR 2021-22 &ONWARDS)

Approved the Syllabus by BOS(UG) on dated 22-09-2021 and Faculty on dated 24-09-2021
Approved the Syllabus by BOS(UG) on dated 24-09-2022 and Faculty on dated 26-09-2022

BACHELOROF SCIENCE (B.Sc.) NEP-2020 CBCS SYLLABUS

(NEP-2020 CBCS Scheme)

(With effect from the academic year 2021-22 and onwards)

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Dept. of Computer Science
Gulbarga University, Gulbarga

Preamble

Computer Science has been evolving as an important branch of science and technology in last two decade and it has carved out a space for itself like Computer Science and Engineering. Computer Science spans theory and more application and it requires thinking both in abstract terms and in concrete terms.

The ever-evolving discipline of Computer Science has strong connections to other disciplines. Many problems in science, engineering, health care, business, and other areas can be solved effectively with computers and its applications, but finding a solution requires both computer science expertise and knowledge of the particular application domain. Computer science has a wide range of specialties. These include Computer Architecture, Software Systems, Graphics, Artificial Intelligence, Mathematical and Statistical Analysis, Data Science, Computational Science, and Software Engineering.

Universities and other HEIs introduced programmes of Computer Science. Information Technology is growing rapidly. Increasing applications of computers in almost all areas of human endeavor has led to vibrant industries with concurrent rapid change in technology. Unlike other basic disciplines, developing core competency in this discipline that can be reasonably stable becomes a challenge.

In India, it was initially introduced at the Master (postgraduate) level as M.Sc., MCA and M.Tech. Later on, engineering programmes such as B.Tech and B.E in Computer Science & Engineering and in Information Technology were introduced in various engineering College/Institutions to cater to the growing demand for trained engineering manpower in IT industries. Parallelly, BCA, B.Sc. and M.Sc. programmes with specialization in Computer Science were introduced to train manpower in this highly demanding area.

B.Sc. and B.Sc. (Hons) are aimed at undergraduate level training facilitating multiple career paths. Students so graduated, can take up postgraduate programmes in CS or MCA leading to research as well as R&D, can be employable at IT industries, or can pursue a teaching profession or can adopt a business management career.

B.Sc. and B.Sc. (Hons) aims at laying a strong foundation of computer application at an early stage of the career. There are several employment opportunities and after successful completion of B.Sc. graduating students can fetch employment directly in companies as programmer, Web Developer, Software Engineer, Network Administrator, Data Scientist, or AI/ML personnel.

The Program outcomes in B.Sc. are aimed at allowing flexibility and innovation in design and development of course content, in method of imparting training, in teaching learning process and in assessment procedures of the learning outcomes. The emphasis in B.Sc. courses, in outcome-based curriculum framework, help students learn solving problems, accomplishing IT tasks, and expressing creativity, both individually and collaboratively. The proposed framework will help Students learn programming techniques and the syntax of one or more programming languages.

All students must, therefore, have access to a computer with a modern programming language installed. The computer science framework does not prescribe a specific language. The teacher and students will decide which modern programming languages students will learn. More importantly, students will learn to adapt to changes in programming languages and learn new languages as they are developed.

The present Curriculum Framework for B.Sc. degrees is intended to facilitate the students to achieve the following.

- To develop an understanding and knowledge of the basic theory of Computer Science and Information Technology with good foundation on theory, systems and applications such as algorithms, data structures, data handling, data communication and computation

- To develop the ability to use this knowledge to analyze new situations in the application domain

- To acquire necessary and state-of-the-art skills to take up industry challenges. The objectives and outcomes are carefully designed to suit to the above-mentioned purpose.

- The ability to synthesize the acquired knowledge, understanding and experience for a better and improved comprehension of the real-life problems

- To learn skills and tools like mathematics, statistics and electronics to find the solution, interpret the results and make predictions for the future developments

- To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems and evaluate
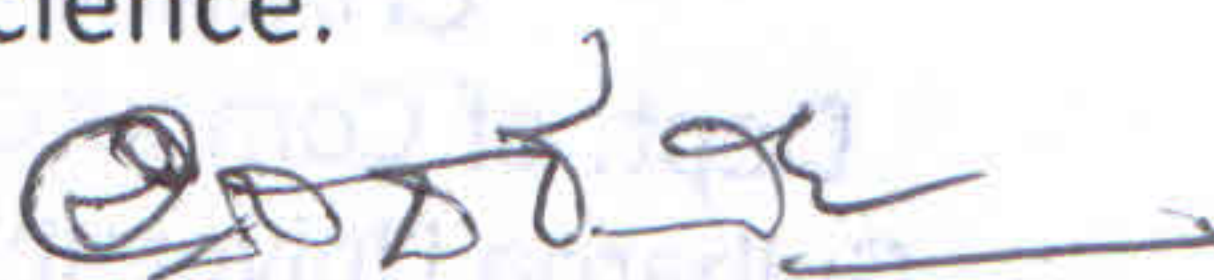
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The objectives of the Programme are:

1. The primary objective of this program is to provide a foundation of computing principles and business practices for effectively using/managing information systems and enterprise software

2. It helps students analyze the requirements for system development and exposes students to business software and information systems

3. This course provides students with options to specialize in legacy application software, system software or mobile applications

4. To produce outstanding IT professionals who can apply the theoretical knowledge into practice in the real world and develop standalone live projects themselves

5. To provide opportunity for the study of modern methods of information processing and its applications.

6. To develop among students the programming techniques and the problem- solving skills through programming

7. To prepare students who wish to go on to further studies in computer science and related subjects.

8. To acquaint students to Work effectively with a range of current, standard, Office Productivity software applications

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Program Outcomes: **B.Sc.** (3 Years) **Degree**

1. **Discipline knowledge:** Acquiring knowledge on basics of Computer Science and ability to apply to design principles in the development of solutions for problems of varying complexity

2. **Problem Solving:** Improved reasoning with strong mathematical ability to Identify, formulate and analyze problems related to computer science and exhibiting a sound knowledge on data structures and algorithms.

3. **Design and Development of Solutions:** Ability to design and development of algorithmic solutions to real world problems and acquiring a minimum knowledge on statistics and optimization problems. Establishing excellent skills in applying various design strategies for solving complex problems.

4. **Programming a computer:** Exhibiting strong skills required to program a computer for various issues and problems of day-to-day applications with thorough knowledge on programming languages of various levels.

5. **Application Systems Knowledge**: Possessing a sound knowledge on computer application software and ability to design and develop app for applicative problems.

6. **Modern Tool Usage:** Identify, select and use a modern scientific and IT tool or technique for modeling, prediction, data analysis and solving problems in the area of Computer Science and making them mobile based application software.

7. **Communication:** Must have reasonably good communication knowledge both in oral and writing.

8. **Project Management:** Practicing of existing projects and becoming independent to launch own project by identifying a gap in solutions.

9. **Ethics on Profession, Environment and Society:** Exhibiting professional ethics to maintain the integrality in a working environment and also have concern on societal impacts due to computer-based solutions for problems.

10. **Lifelong Learning:** Should become an independent learner. So, learn to learn ability.

11. **Motivation to take up Higher Studies:** Inspiration to continue educations towards advanced studies on Computer Science.

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Additional Program Outcomes: **B.Sc. Degree** (Hons)

The Bachelor of Computer Science (B.Sc. (Hons)) program enables students to attain following additional attributes besides the afore-mentioned attributes, by the time of graduation:

1. Apply standard Software Engineering practices and strategies in real -time software project development

2. Design and develop computer programs/computer -based systems in the areas related to AI, algorithms, networking, web design, cloud computing, IoT and data analytics.

3. Acquaint with the contemporary trends in industrial/research settings and thereby innovate novel solutions to existing problems

4. The ability to apply the knowledge and understanding noted above to the analysis of a given information handling problem.

5. The ability to work independently on a substantial software project and as an effective team member.

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Gulbarga University, Kalaburagi
Department of Computer Science

Proceedings of the meeting of Board of Studies (UG) in Computer Science held on 22-09-2021 at 11.00AM in the Department of Computer Science, Gulbarga University, Kalaburagi:

Members were present online and off-line :

1.Shivanand.S.Rumma	Chairman	
2. Sri. Syed Arifulla	Member	
3. Sri. Chandrashekhar S.	Member	
4. Sri.Syed Minhaj Ul Hassan	Member	
5. Sri.Gururaj A. Nagalikar	Member	
6. Dr.Sridevi	Member -Online	
7. Dr.Vikas Humbe	Member -Online	

1. The Board prepared the NEP-2020 structure & CBCS syllabi for B.Sc.(Basic & Honours) with Computer Science & B.C.A. (Basic & Honours) courses according to the circular issued by the Registrar, Gulbarga University, Kalaburagi vide Ref.No. GUK/ACA/NEP/2021-22/675 dated : 20.09.2021 & No.GUK/ACA/BOS/2021-22/688, dated : 21.09.2021. Further, it resolved to accept and approve the syllabi of B.Sc. (Basic & Honours) & B.C.A. (Basic & Honours) courses to be introduced from the academic year 2021-22 onwards. (The said syllabi of B.Sc. & B.C.A. are enclosed, Annexure -I).

2. The board resolved to accept and approved the following.

   i. 4 years Undergraduate course B.Sc.(Basic & Honours) with Computer Science & B.C.A. (Basic & Honours) .

   ii. The titles of B.Sc. (Basic & Honours) with Computer Science & B.C.A .(Basic & Honours) from I Semester to VIII semesters of 4 years UG programme.

   iii. Detailed curriculum contents of B.Sc. (Basic & Honours) with Computer Science & B.C.A. (Basic & Honours) of I and II Semesters only.

3. The Papers CAC03(a)/(b) Mathematical Foundation/Accountancy and CAC06 Discrete Mathematical Structures in B.C.A Course are taught by the Computer Science faculty only. Hence board resolved to accept and approve the same.

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Gulbarga University, Kalaburagi
Department of Computer Science

Proceedings of the Online meeting of Board of Studies (UG) in Computer Science held on 24-09-2022

Members were present online and off-line :

1.Dr. Shivanand.S.Rumma	Chairman	
2. Sri. Syed Arifulla	Member	Online
3. Sri. Chandrashekhar S.	Member	Online
4. Sri.Syed Minhaj Ul Hassan	Member	Online
5. Sri.Gururaj A. Nagalikar	Member	Online
6. Dr.Sridevi	Member	Online

1. The Board prepared the NEP-2020 structure & CBCS syllabi for B.Sc.(Basic & Honours) with Computer Science & B.C.A. (Basic & Honours) courses according to the circular issued by the Registrar, Gulbarga University, Kalaburagi vide Ref.No. GUK/ACA/BOS-NEP/2022-23/01 dated : 19.09.2022. Further, it resolved to accept and approve the syllabi of B.Sc. (Basic & Honours) & B.C.A. (Basic & Honours). (The said syllabi of B.Sc. & B.C.A. are enclosed, Annexure -I).

2. The board resolved to accept and approved the following.

   i. The titles of B.Sc. (Basic & Honours) with Computer Science & B.C.A .(Basic & Honours) from I Semester to VIII semesters of 4 years UG programme.
   ii. Detailed curriculum contents of B.Sc. (Basic & Honours) with Computer Science & B.C.A. (Basic & Honours) of I, II, III, & IV Semester including SEC-2 Artificial Intelligence and revised syllabus of SEC-1 Digital Fluency prescribed for all UG courses.

3. The Papers BCAC03T(a) / BCAC03T(b) Mathematical Foundation/Accountancy and BCAC06T Discrete Mathematical Structures in B.C.A Course must be taught by the Computer Science faculty only. Hence board resolved to accept and approve the same.

4. The Papers SEC1 Digital Fluency and SEC2 Artificial Intelligence prescribed for all Degree courses must be taught by the Computer Science faculty only. Hence board resolved to accept and approve the same.

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IIA. Model Program Structures for the Under-Graduate Programs in Universities and Colleges in Karnataka

Bachelor of Arts (Basic/ Hons.)/ Bachelor of Science (Basic/ Hons.) in subjects with practical, with one major and one minor

Sem.	Discipline Core (DSC) (Credits) (L+T+P)	Discipline Elective(DSE) / Open Elective (OE) (Credits) (L+T+P)	Ability Enhancement Compulsory Courses (AECC), Languages (Credits) (L+T+P)	Skill based (Credits) Skill Enhancement Courses (SEC) (L+T+P)	Value based (Credits) (L+T+P)	Total Credits
I	Discipline A1(4+2), Discipline B1(4+2)	OE-1 (3)	L1-1(3), L2-1(3) (4 hrs each)	SEC-1: Digital Fluency (2) (1+0+2)	Physical Education - Yoga (1) (0+0+2) / Health & Wellness (1) (0+0+2)	25
II	Discipline A2(4+2), Discipline B2(4+2)	OE-2 (3)	L1-2(3), L2-2(3) (4 hrs each)	Environmental Studies (2)	Physical Education - Sports (1) (0+0+2) / NCC/NSS/R&R(S&G)/ Cultural (1) (0+0+2)	25
			Exit option with Certificate (50 credits)			
III	Discipline A3(4+2), Discipline B3(4+2)	OE-3 (3)	L1-3(3), L2-3(3) (4 hrs each)	SEC-2: Artificial Intelligence (2)(1+0+2)	Physical Education - Sports (1) (0+0+2) / Cultural (1) (0+0+2)	25
IV	Discipline A4(4+2), Discipline B4(4+2)	OE-4 (3)	L1-4(3), L2-4(3) (4 hrs each)	Constitution of India (2)	Physical Education - Sports (1) (0+0+2) / NCC/NSS/R&R(S&G)/ Cultural (1) (0+0+2)	25
		Exit option with Diploma (100 credits) OR Choose any one of the core subjects as Major and the other as Minor				
V	Discipline A5(3+2), Discipline A6(3+2), Discipline B5(3+2)	Vocational-1 (3)		SEC-3: SEC such as Cyber Security (2) (1+0+2)	Physical Education - Sports (1) (0+0+2) / NCC/NSS/R&R(S&G)/ Cultural (1) (0+0+2)	22
VI	Discipline A7(3+2), Discipline A8(3+2), Discipline B6(3+2)	Vocational-2 (3) Internship (2)		SEC-4: Professional Communication (2)	Physical Education - Sports (1) (0+0+2) / NCC/NSS/R&R(S&G)/ Cultural (1) (0+0+2)	24
		Exit option with Bachelor of Arts, B.A./ Bachelor of Science, B.Sc. Basic Degree (with a minimum of 144 credits) or continue studies with the Major				
VII	Discipline A9(3+2), Discipline A10(3+2), Discipline A11(3)	Discipline A, E-1 (3), Discipline A, E-2 (3), Res.Methodology (3)				22
VIII	Discipline A12(3+2), Discipline A13(3), Discipline A14(3)	Discipline A, E-3(3), Research Project (6)*				20
		Award of Bachelor of Arts Honours, B.A. (Hons.)/ Bachelor of Science Honours, B.Sc. (Hons) degree in a discipline (with a minimum of 186 credits)				

*In lieu of the research Project, two additional elective papers/ Internship may be offered.

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Curriculum Structure

Program: B.Sc. (Basic and Honors)   Subject: Computer Science

1. Computer Science as MAJOR with another Subject as MINOR (Table IIA of Curriculum)

Sem	Discipline Specific Core Courses (DSC)	Hour of Teaching/ Week		Discipline Specific Elective Courses (DSE)/ Vocational Courses (VC)/OE	Hour of Teaching/ Week
		Theory	Lab		
1	CSDSC1T: Computer Fundamentals and Programming in C	4		CSOET 1: Office Automation	3
	CSDSC1P: C Programming Lab		4		
2	CSDSC2T: Data Structures using C	4		CSOET 2: E-Commerce	3
	CSDSC2P: Data structuresLab		4		
3	CSDSC3T: Object Oriented Programming using JAVA	4		CSOET 3: C Programming Concepts	3
	CSDSC3P: JAVA Lab		4		
4	CSDSC4T: Database Management Systems	4		CSOET 4: Python Programming Concepts	3
	CSDSC4P: DBMS Lab		4		
5	CSDSC5T: Programming in PYTHON	3		VC-1:	
	CSDSC6T: Computer Networks	3		Any one from Vocational Courses, Group – 1*	3
	CSDSC5P: PYTHON Programming lab		4		
	CSDSC6P: Computer Networks Lab		4		
6	CSDSC7T: Internet Technologies	3		VC-2:	
	CSDSC8T: Operating System Concepts	3		Any one from Vocational Courses, Group – 2*	3
	CSDSC7P: JAVA Script, HTML, CSS Lab		4		
	CSDSC8P: Operating System Lab		4	Internship:	2
7	CSDSC9T: Computer Graphics and Visualization	3		DSE-1:	
	CSDSC10T: Design and Analysis of Algorithms	3		Any one from Discipline Specific Elective Courses, Group – 1**	3
	CSDSC11T: Software Engineering		4	DSE-2:	
	CSDSC9P: Computer Graphics and Visualization Lab		4	Any one from Discipline Specific Elective Courses, Group – 2**	3
	CSDSC10P: DAA Lab			Research Methodology:	3
8	CSDSC12T: Artificial Intelligence and Applications	3		DSE-3:	
	CSDSC13T: Computer Organization and Architecture	3		Any one from Discipline Specific Elective Courses, Group – 3**	
	CSDSC14T: Data Warehousing and Data Mining	3			3
	CSDSC12P: AI Lab		4	Research Project:	6

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2. Computer Science as MINOR with another Subject as MAJOR (As per Table IIA of Model Curriculum)

Semester	Discipline Specific Core Courses (DSC)	Hour of Teaching/ Week	
		Theory	Lab
1	CSDSC1T: Computer Fundamentals and Programming in C	4	
	CSDSC1P: C Programming Lab		4
2	CSDSC2T: Data Structures using C	4	
	CSDSC2P:Data structures Lab		4
3	CSDSC3T: Object Oriented Programming using JAVA	4	
	CSDSC3P:JAVA Lab		4
4	CSDSC4T: Database Management Systems	4	
	CSDSC4P:DBMS Lab		4
5	CSDSC5T: Programming in PYTHON	3	
	CSDSC5P:PYTHON Programming lab		4
6	CSDSC6T: Internet Technologies	3	
	CSDSC6P: JAVA Script, HTML, CSS Lab		4

*Vocational Courses:

Group-1:	Group-2:
1. CSVC11T: DTP, CAD andMultimedia 2. CSVC12T: Hardware and Server Maintenance 3. CSVC13T: Web Designing	1. CSVC21T: Health CareTechnologies 2. CSVC22T: DigitalMarketing 3. CSVC23T: Multimedia Processing

**Discipline Specific Elective Courses:

Group-1:	Group-2:	Group-3:
1. CSDSE11T: IoT 2. CSDSE12T: Cyber Law and CyberSecurity 3. CSDSE13T: Web Programming - PHP and MySQL 4. CSDSE14T: Clouds, Grids, andClusters 5. CSDSE15T: Software Testing	1. CSDSE21T: Information and 2. CSDSE22T:Network Security 3. CSDSE23T:Data Compression 4. CSDSE24T:Discrete Structures 5. CSDSE25T:MultimediaComputing	1. CSDSE31T:: Data Analytics 2. CSDSE32T: Storage AreaNetworks 3. CSDSE33T:ParallelProgramming 4. CSDSE34T:Digital SignalProcessing 5. CSDSE35T:Big Data Analytics

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Course-Type	Course Code as referred above	Compulsory/ Elective	List of compulsory courses and list of option of elective courses.
SEC	SEC 1	Compulsory	SEC 1: Digital Fluency
	SEC 2	Compulsory	SEC 2: Artificial Intelligence
	SEC 3	Compulsory	SEC 3: Cyber Security
	SEC 4	Compulsory	SEC 4: Professional Communication
Value based SEC		Compulsory	VBC-1 Physical Education-Yoga VBC-2 Health & Wellness VBC-3 Physical Education-Sports VBC-4 NCC/NSS/R&R VBC-5 Physical Education-Sports VBC-6 Cultural VBC-7 Physical Education-Sports VBC-8 NCC/NSS/R&R VBC-9 Physical Education-Sports VBC-10 NCC/NSS/R&R VBC-11 Physical Education-Sports VBC-12 NCC/NSS/R&R
AECC	AECC1C	Compulsory	Environmental Studies
	AECC2C	Compulsory	Constitution of India
Language 1	L1-1, L1-2, L1-3, L1-4	Compulsory	Kannada/Functional Kannada
Language 2	L2-1, L2-2, L2-3, L4-4	Elective	English/Hindi/French/ Additional English/ etc.

Research Paper for B.Sc. Hons

1. **Research Methodology**

Theory Question Paper Pattern for B.Sc. /BCA
(For DCC/DSE/OE)

Section-A				
Answer any Five of the following Questions			**5x2=10**	
Q1	a	Question to be asked from Unit-I		
	b	Question to be asked from Unit-I		
	c	Question to be asked from Unit-II		
	d	Question to be asked from Unit-II		
	e	Question to be asked from Unit-III		
	f	Question to be asked from Unit-IV		
	g	Question to be asked from Unit-V		
Section-B				
Answer any Four of the following Questions			**4x5=20**	
2	Question to be asked from Unit-I			
3	Question to be asked from Unit-I			
4	Question to be asked from Unit-II			
5	Question to be asked from Unit-III			
6	Question to be asked from Unit-IV			
7	Question to be asked from Unit-V			
Section-C				
Answer any Three of the following Questions			**3x10=30**	
8	Question to be asked from Unit-I			
9	Question to be asked from Unit-II			
10	Question to be asked from Unit-III			
11	Question to be asked from Unit-IV			
12	Question to be asked from Unit-V			

Note : While drawing the Questions, all the units in the syllabus must be given equal weightage.

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